

## A POLYESTERAMINE INGREDIENT AND USE OF SAME

## BACKGROUND OF THE INVENTION

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This application claims priority from U.S. Provisional Application Serial No. 60/437,433, filed December 30, 2002.

1. Field of the Invention

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The present invention relates to a polyesteramine ingredient and use of the same. More particularly, the present invention relates to the use of the polyesteramine in a variety of personal care, hair care and cosmetic products to provide 15 water resistance, shine, gloss, surface smoothening and film-forming benefits.

2. Description of the Related Art

20 Water resistance, shine, gloss, surface smoothening, and film-forming are all desirable attributes in personal care, nail care and cosmetic compositions, products and preparations. For example, water resistance is a much-desired quality amongst consumers of color cosmetics, lipsticks, eyelash mascara, insect

repellents and sunscreen preparations. Additionally, shine and gloss are much desired attributes in nail color and hair care preparations. Surface smoothening is important in a shampoo, hair conditioner, styling mousse and other hair treatment 5 preparation and can provide superior wet and dry hair combing. Film-forming is a desired attribute in, for example, body wash, liquid soap, hair color and skin care preparations.

There is a long felt need in cosmetic industry for a single 10 ingredient which, when incorporated into formulated compositions, can deliver multiple functions to these compositions, including the aforementioned desired attributes and benefits.

15 Such results can now be attained by the use of compositions that have an effective amount of a polyesteramine according to the present invention as a single ingredient. This single ingredient delivers multiple performance advantages to a composition that heretofore had required the use of a number of 20 different ingredients. Furthermore, these performance advantages have not been achieved by simple esteramines known in the literature.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a composition that provides at least one of the following 5 benefits: hair detangling, improved wet and dry combing, shine, gloss, conditioning, surface smoothening, water resistance, film-forming properties, static charge reduction, thickening and surfactant activity.

10 It is another object of the present invention to provide a composition having a polyesteramine as an active ingredient.

It is still another object of the present invention to provide a personal care product, such as, hair care, skin care, 15 nail care and other cosmetic products, such as, shampoo, hair conditioner, styling mousse, hair treatment preparation, hair coloring product, semi-perm product, oxidation dye, body wash, liquid soap, skin care preparation, lipstick, mascara, color cosmetic, nail care preparation, cream, foam, gel, lotion, 20 solution, pomade, mousse, stick, pump spray, aerosol spray, serum and any combination thereof, which has a polyesteramine.

It is a further object of the present invention to provide a method of applying a composition having a polyesteramine to

skin, hair or nail, to produce at least one benefit selected from hair detangling, improved wet and dry combing, shine, gloss, conditioning, surface smoothening, water resistance, film-forming properties, static charge reduction, thickening and

5 surfactant activity.

These and other objects and advantages of the present invention are achieved by the use of a composition having a polyesteramine as an active ingredient in a personal care

10 product, such as, hair care, skin care, nail care and other cosmetic product applications.

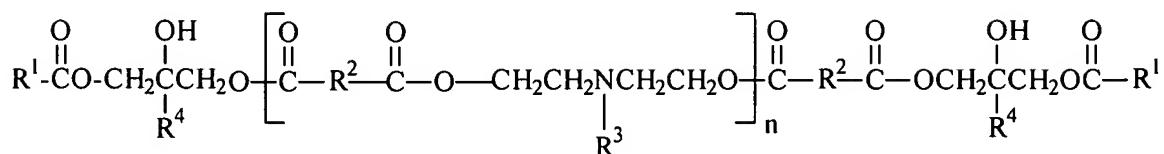
#### DETAILED DESCRIPTION OF THE INVENTION

15 The present invention relates to a polyesteramine or a polyesteramine compound and its use in a personal care, hair care, nail care or other cosmetic compositions. The unique structure of the polyesteramine according to the present invention allows the polyesteramine to provide multiple

20 benefits, including hair detangling, improved wet and dry combing, shine, gloss, conditioning, surface smoothening, water resistance, film-forming properties, static charge reduction, thickening and/or surfactant activity.

The polyesteramine according to the present invention is represented by the formula:

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wherein each  $\text{R}^1$  is independently a linear, branched or cyclic hydrocarbyl group; each  $\text{R}^2$  is independently the same or different hydrocarbylene group; each  $\text{R}^3$  is independently hydrogen or a hydrocarbyl group; each  $\text{R}^4$  is independently hydrogen, methyl or ethyl; and  $n$  is an integer from 1 to about 60. More preferably, each  $\text{R}^1$  in the polyesteramine is independently a linear, branched or cyclic hydrocarbyl group of 3 to 23 carbon atoms, and most preferably each  $\text{R}^1$  is independently a linear, branched or cyclic hydrocarbyl group of 16 to 22 carbon atoms.

In a preferred embodiment,  $\text{R}^1$  is a hydrocarbyl group of 17 carbon atoms, which can be the hydrocarbyl group of an 20 isooctadecanoic acid, such as, the hydrocarbyl group of isostearic acid. In another preferred embodiment,  $\text{R}^1$  is a

hydrocarbyl group of 21 carbon atoms, such as, the hydrocarbyl group of behenic acid.

The  $R^2$  group in the polyesteramine preferably is a

5 hydrocarbylene group of 1 to 10 carbon atoms. More preferably,  $R^2$  is a hydrocarbylene group of 2 to 6 carbon atoms. Thus, when  $R^2$  is a hydrocarbylene group of 4 carbon atoms,  $R^2$  represents the alkylene group of adipic acid. When  $R^2$  is a hydrocarbylene group of 6 carbon atoms,  $R^2$  represents the alkylene group of sebacic

10 acid.

The  $R^3$  group in the polyesteramine is preferably a hydrocarbyl group of 1 to 6 carbon atoms. Examples of such groups include linear, branched or cyclic hydrocarbyl groups, such as, methyl, ethyl, propyl, butyl, pentyl, hexyl, iso-propyl, iso-butyl, cyclo-propyl, cyclo-butyl, cyclo-pentyl and cyclo-hexyl. Preferably, the  $R^3$  group is a hydrocarbyl group of 1 to 3 carbon atoms, and includes methyl, ethyl, propyl, iso-propyl and cyclo-propyl. Most preferably, the  $R^3$  group is methyl

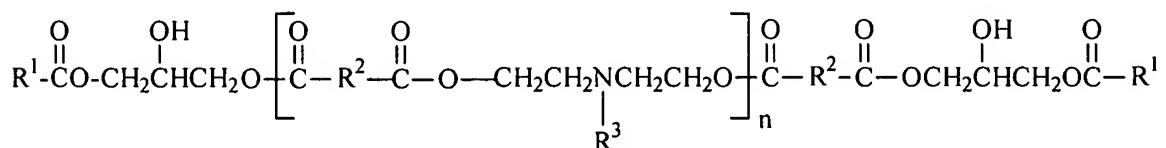
15 or ethyl.

The polyesteramine can have any molecular weight that is suitable for a particular application. Generally, however, low molecular weight polyesteramines that have sufficient solubility

in the vehicle in a given formulation are preferred. Thus, polyesteramines wherein n is from 1 to 60, generally are suitable for use in a majority of applications. The polyesteramines wherein n is from 1 to 25 are preferred and

5 polyesteramines wherein n is from 1 to 10 are most preferred.

In a preferred embodiment, the polyesteramine is represented by the formula:



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wherein R<sup>1</sup> is a linear, branched or cyclic hydrocarbyl group; R<sup>2</sup> is a hydrocarbylene group; R<sup>3</sup> is selected from the group consisting of: hydrogen and a hydrocarbyl group; and n is an integer from 1 to about 60. More preferably, each R<sup>1</sup> in the

15 polyesteramine is independently a linear, branched or cyclic hydrocarbyl group of 3 to 23 carbon atoms, and most preferably each R<sup>1</sup> is independently a linear, branched or cyclic hydrocarbyl group of 16 to 22 carbon atoms.

20 The present invention also provides a composition for topical application to hair, skin or nails, which includes a polyesteramine as disclosed herein.

The polyesteramine is present in the composition in an amount effective to provide at least one benefit, such as, hair detangling, improved wet and dry combing, shine, gloss, 5 conditioning, surface smoothening, water resistance, film-forming properties, static charge reduction, thickening or surfactant activity.

Preferably, the composition is in a form, such as, shampoo, 10 hair conditioner, styling mousse, hair treatment preparation, hair coloring product, semi-perm product, oxidation dye, body wash, liquid soap, skin care preparation, lipstick, mascara, color cosmetic, nail care preparation (e.g., enamel) or any combination thereof.

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Preferably, the polyesteramine is present in the composition in an amount from about 0.01 wt% (weight percent) to about 40 wt% based on the total weight of the composition. More preferably, the polyesteramine is present in an amount from 20 about 0.05 wt% to about 20 wt% based on the total weight of said composition. Most preferably, the polyesteramine is present in an amount from about 0.1 wt% to about 10 wt% based on the total weight of the composition.

The composition can further include one or more additional components selected from antimicrobials, antioxidants, buffering agents, chelating agents, colorants, conditioning agents, emollients, emulsifiers, film formers, fragrances, humectants, 5 lubricants, moisturizers, pigments, preservatives, skin penetration enhancers, stabilizers, surfactants, thickeners, viscosity modifiers, vitamins or any combination thereof.

When the composition is a hair conditioner, the 10 polyesteramine is present in an amount from about 0.01 wt% to about 10 wt% based on the total weight of said composition, and preferably from about 0.1 wt% to about 5 wt% based on the total weight of the composition.

15 When the composition is a hair styling product, the polyesteramine is present in an amount from about 0.1 wt% to about 10 wt% based on the total weight of the composition.

When the composition is a styling gel, the polyesteramine 20 is present in an amount from about 0.1 wt% to about 4.0 wt% based on the total weight of the composition.

When the composition is a body wash, the polyesteramine is present in an amount from about 0.1 wt% to about 4 wt% based on the total weight of the composition.

5        When in the form of a shampoo, the hair care compositions of the present invention typically have one or more surfactants present in an amount sufficient to clean the hair. Preferably, the amount is about 5 wt% to about 20 wt% based on the total weight of the composition. The surfactants in shampoo

10      compositions can include anionic, nonionic or amphoteric surfactants, or mixtures of these surfactants.

When in the form of a leave-on conditioner, the compositions of the present invention preferably have a

15      relatively smaller amount of a non-ionic surfactant typically in the range from about 0.01 wt% to about 3.0 wt% based on the total weight of the composition. When in the form of a leave-on conditioner, the compositions preferably have a fatty alcohol and an ethoxylated fatty alcohol having from about 12 to about

20      36 carbon atoms. Such fatty alcohols and ethoxylated alcohols are typically present in an amount from about 0.01 wt% to about 5.0 wt% based on the total weight of the composition. Examples of such fatty alcohols include, but are not limited to, lauryl alcohol, cetyl alcohol, stearyl alcohol, behenyl alcohol, or any

combinations thereof. Examples of such ethoxylated fatty alcohols include all fatty alcohols with the ethoxylation from 2 moles to 30 moles.

5 The present compositions typically have a vehicle. The vehicle should be a physiologically acceptable or suitable vehicle. In the context of the present invention, the term "physiologically acceptable vehicle" or "suitable vehicle" refer to any vehicle for a drug, a cosmetic or a medicament that is  
10 suitable for use in direct, safe contact with human tissues.

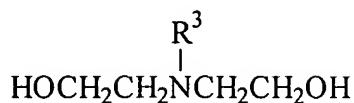
Preferably, the polyesteramine is incorporated into a suitable topical vehicle to form a topical formulation prior to applying.

15 The compositions having the polyesteramine of the present invention can be in a number of different product forms. Such suitable product forms include a cream, aerosol or pump spray, mousse, foam, gel, lotion, stick, pomade, solution, or a product  
20 form in which the polyesteramine is incorporated into a patch or towelette.

The polyesteramine according to the present invention can be prepared by methods known to those skilled in the art, for

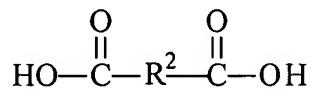
example, by contacting the components of a reaction mixture, which includes:

(a) a diethanolamine compound represented by the formula:

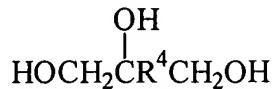


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(b) a dicarboxylic acid represented by the formula:



(c) a triol represented by the formula:



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and

(d) a monocarboxylic acid represented by the formula:



wherein each  $\text{R}^1$  is independently a linear, branched or

15 cyclic hydrocarbyl group of 16-22 carbon atoms; each  $\text{R}^2$  is

independently a hydrocarbylene group; each R<sup>3</sup> is independently hydrogen or a hydrocarbyl group; and each R<sup>4</sup> is independently hydrogen, methyl or ethyl.

5        The contacting step is carried out under conditions sufficient to produce a polyesteramine according to the present invention, wherein n is an integer from 1 to about 60.

The components of the reaction mixture can be contacted  
10 either sequentially or simultaneously. Preferably, the diethanolamine compound, said dicarboxylic acid, said triol and said monocarboxylic acid are contacted in a molar ratio of 1.4-1.6 moles of said dicarboxylic acid, 1.4-1.6 moles of said triol and 1.4-1.6 moles of said monocarboxylic acid to each mole of  
15 said diethanolamine compound. Preferably, the contacting is carried out in the presence of an esterification catalyst, such as, a protic, organometallic or Lewis acid catalyst.

The present invention further includes methods of using the  
20 composition according to the present invention that have a polyesteramine as an active ingredient in various personal care products, such as, hair care, skin care, nail care and cosmetic products.

In one aspect, the present invention provides a method of imparting to hair, skin or nails an attribute selected from hair detangling, improved wet and dry combing, shine, gloss, conditioning, surface smoothening, water resistance, film-forming properties, static charge reduction or any combination thereof.

5 The method includes the step of applying onto the hair, skin or nails an effective amount of a composition having a 10 polyesteramine according to the present invention.

In another aspect, the present invention provides a method of enhancing the appearance of hair. The method includes the steps of applying onto the hair an effective amount of a 15 composition having a polyesteramine according to the present invention.

In still another aspect, the present invention provides a method of styling hair to produce improved styling hold and/or 20 improved curl retention. The method includes the step of applying onto the hair an effective amount of a composition having a polyesteramine according to the present invention.

In yet another aspect, the present invention provides a method of conditioning hair. The method includes the step of applying onto the hair an effective amount of a composition having a polyesteramine according to the present invention.

5 Hair treated in this manner has improved smoothness.

In a further aspect, the present invention provides a method of cleansing skin. The method includes the step of applying onto the skin an effective amount of the composition

10 having a polyesteramine according to the present invention.

The invention is further described in the following example, which is intended to be illustrative and not limiting.

15 **Wet Comb Method**

The performance of the polyesteramine material in a conditioner base was compared with stearamidopropyl dimethylamine, a conditioning agent that is commonly used to 20 serve as the standard for the comparison. Representative formulas are shown in the Table herein below:

Table: Conditioner Composition **A** Having Polyesteramine and Conditioner Composition **B** Having Stearamidopropyl Dimethylamine

		<b>A</b>	<b>B</b>
	water	94.4	94.4
	ethyl hydroxyethylcellulose	1.0	1.0
5	ceteareth-20	0.5	0.5
	cetyl alcohol	1.0	1.0
	stearyl alcohol	2.5	2.5
	polyesteramine	0.5	-
	stearamidopropyl dimethylamine	-	0.5
10	Kathon CG <sup>a</sup>	0.1	0.1

15 <sup>a</sup> Kathon CG is a mixture of methylchloroisothiazolinone and  
methyliothiazolinone, available commercially from Rohm & Haas  
Co., Philadelphia, PA.

To evaluate the utility of the polyesteramine as a  
detangling agent for improved combing, wet comb tensile studies  
were performed using a Dia-Stron MTT170 Miniature Tensile  
20 Testing Unit and corresponding software MTTW in Version 6.0,  
available from Diastron Limited. Hair swatches used for studies  
were one by six inch, medium density, Caucasian brown tresses  
purchased from International Hair Importers and Products, Inc.,  
Floral Park, NY. For each test run 0.5 mL of product was  
25 applied to the hair tress. Wet comb tensile studies resulted in  
total work reduction of 20.63 % for formula **A**, while formula **B**  
had a total work reduction of 18.11 %. Total work is defined  
herein as the amount of force required to comb through the hair  
tress. Thus, the polyesteramine material does indeed provide  
30 significant conditioning benefits that are greater than benefits  
provided by conditioners commonly used in the industry.

The following are examples of compositions having the polyesteramine according to the present invention.

### Shampoo

Ingredient	Weight%
Distilled water	QS
Guar Hydroxypropyltromonium Chloride	0.4
Citric acid	0.1
Disodium EDTA	0.1
Methylparaben	0.2
Cocamide MEA	2.0
Glycol Distearate	0.75
Na Lauryl Ether Sulfate	18.0
Polyesteramine	1.0
Fragrance	0.5
Methylisothiazolinone, Methylchloroisothiazolinone	0.066

### Conditioner

Ingredient	Weight%
Distilled water	QS
HEC and Dialkyldimethyl Ammonium Chloride	0.25
Polyesteramine	2.0
Citric acid	0.3
Disodium EDTA	0.1
Methylparaben	0.2
Cetearyl alcohol/Cetearyl-20	0.3

Stearamidopropyl	0.5
Dimethylamine	
Cetyl Alcohol	2.0
Cetyl/stearyl Alcohol	4.0
Propylparaben	0.1
Phenoxyethanol	0.5
Fragrance	0.75

## Mousse

Ingredient	Weight%
Distilled water	QS
Imidazolidinyl Urea	0.5
HEC and Dialkyldimethyl Ammonium Chloride	3.0
Polyesteramine	1.0
Isoceteth-20	0.5
Fragrance	0.3

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## Gel

Ingredient	Weight %
Distilled water	91.6
Disodium EDTA	0.1
Imidazolidinyl Urea	0.5
Carbomer	0.5
Aminomethyl Propanol	0.5
PVPVA copolymer	6.0
Polyesteramine	0.5
Fragrance	0.3

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## Body Wash

Ingredient	Weight%
Polyesteramine	1.0
Fatty acids (e.g., Lauric acid, Myristic acid, Palmitic acid, Stearic acid)	20.5
Glycerin	5.0
Potassium hydroxide	5.0
Sodium chloride	2.7
Sodium auroamphoacetate	2.5
Propylene glycol	1.5
Glycol distearate	1.25
Fragrance	1.0
PEG-6	0.5
Triclosan	0.3
Imidazolidinyl urea	0.2
Tetrasodium EDTA	0.05
Distilled water	QS

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## Lipstick

Ingredient	Weight%
Polyesteramine	0.5
Fatty acid esters (e.g., Octyl palmitate, Isopropyl palmitate, Cetyl lactate, Caprylic/Capric triglyceride)	22.5
Wax (e.g., Beeswax, Candellila, Ozokerite, Carnuba)	18.0
Octyl dimethyl PABA	3.0
Lecithin	0.3
Allantoin	0.2
Preservatives (e.g., BHT, BHA)	0.02
Pigments (e.g., D&C Red No. 6 Barium Lake, D&C Red No. 27 Aluminum Lake, D&C Red No. 21 Aluminum Lake, D&C Red No. 7	11.0

Calcium Lake)	
Titanium dioxide	1.0
Oil (e.g., Castor oil, Sesame oil, Soybean oil, Hydrogenated soybean oil, Lanolin oil)	QS

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## Mascara

Ingredient	Weight %
Polyesteramine	0.3
Pentaerythrityl tetrastearate	9.0
Waxes (e.g., Beeswax, Ozokerite, Candelilla, Carnuba)	12.5
Glyceryl stearate	4.7
PVP/Eicosene	4.25
Oleic acid	2.8
Polyisobutane	2.6
Ammonium acrylates copolymer	1.95
Triethanolamine	1.7
Sorbitan sesquioleate	1.0
Benzyl alcohol	0.8
Vitamins (e.g., Panthenol, Tocopheryl acetate calcium pantothenate)	0.5
Sodium silicoaluminate	0.5
Sodium hexametaphosphate	0.4
Preservatives (e.g., Methylparaben, Propylparaben)	0.6
Propylene glycol	0.25
AMP-Isostearic hydrolyzed keratin	0.1
Sodium lauryl sulfate	0.05
SD alcohol 40	0.02
Potassium sorbate	0.02
Propylene glycol stearate	0.01
EDTA	0.005
Pigments (e.g., Ultramarines, Carmine)	14
Distilled water	QS

It should be understood that the foregoing description is only illustrative of the present invention. Various alternatives and modifications can be devised by those skilled in the art without departing from the present invention.

Accordingly, the present invention is intended to embrace all such alternatives, modifications and variations that fall within the scope of the appended claims.